

523, 384

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
19 February 2004 (19.02.2004)

PCT

(10) International Publication Number  
**WO 2004/015694 A2**

- (51) International Patent Classification<sup>7</sup>: **G11B 7/00**
- (21) International Application Number:  
PCT/IB2003/003419
- (22) International Filing Date: 4 August 2003 (04.08.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
02078216.5 5 August 2002 (05.08.2002) EP
- (71) Applicants (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL). **KONICA MINOLTA OPTO, INC.** [JP/JP]; 2970 Ishikawa-machi, Hachioji-shi, Tokyo (JP).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **MORI, Nobuyoshi**

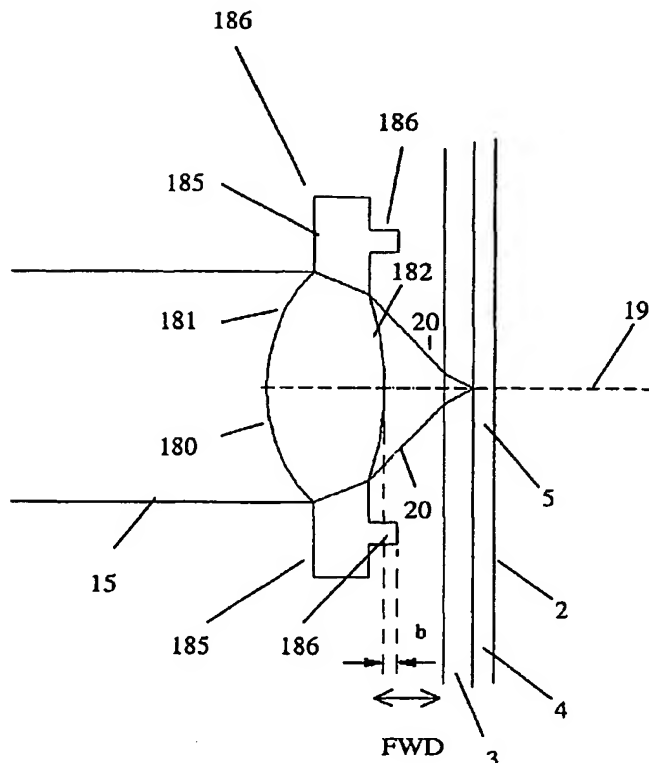
[JP/JP]; 26-2, Nishishinjuku 1-Chome, Shinjuku-ku, Tokyo (JP). **YAGI, Katsuya** [JP/JP]; 26-2, Nishishinjuku 1-chome, Shinjuku-ku, Tokyo (JP). **HENDRIKS, Bernardus, H., W.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **SCHLEIPEN, Johannes, J., H., B.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **VAN AS, Marco, A., J.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(74) Agent: **VISSER, Derk**; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: SCANNING DEVICE INCLUDING AN OBJECTIVE SYSTEM WITH A LENS PROTECTION DEVICE



(57) **Abstract:** An optical scanning device (1) for scanning an information layer (4) of an optical record carrier (2), the device (1) comprising a radiation source (11) for generating a radiation beam (12, 15, 20) and an objective system (18) for converging the radiation beam on the information layer, the information layer being covered by a transparent layer (3) of thickness  $t_d$  and refractive index  $n_d$ . The objective system comprises a lens having a protection device projecting away from the lens towards the optical record carrier such that the distance between the protection device and the optical record carrier is less than the free working distance. The lens satisfies the condition: where  $D$  is the entrance pupil diameter,  $FWD$  is the free working distance, and  $D$ ,  $FWD$ ,  $t$  and  $t_d$  are all expressed in millimeters and where  $FWD + t_d/n_d < 0.51$ .

WO 2004/015694 A2